Description

A Tube made in a Single Piece by Injection of a Plastic Material.

Technical Field

The invention relates to a tube made in a single piece, obtained by injection of a plastic material.

Background Art

For some time now plastic tubes have tended to replace the well-known metal tubes, usually destined to contain fluid products, such as for example creams and cosmetic products in general, which are made of soft materials so that the product in the tube can be squeezed out with a prevalently elastic deformation.

Known tubes usually comprise an open lower part for introduction of the product, which lower part is then closable after the product has been introduced. There is also an upper part which includes a hole for passage of the product as it exits the tube. These tubes are made either by welding the upper part, generally obtained by injection moulding, to a drawn cylindrical tube, or directly pressing the whole tube by plastic injection in a mould. The present invention relates specifically to the latter type of tube.

Tubes made in this way are sent to the product manufacturers, who fill the tubes by introducing the product from the open bottom part, then weld the bottom part and then removably close the passage hole of the top part using a cap which will enable the user to open the tube to dose the product, and to reclose the tube before its next use. The closure of the passage hole is generally obtained either by a screw-cap screwed on a thread made at the position of the through-hole, or by a pressure-cap with a little spur, which sealingly fits on the through-hole.

The production of tubes in a single piece by injection of plastic material involves,

for the manufacturer, some problems due to the very small thickness of the wall of the tube which can be obtained by injection without there being any excessive production rejects. The thickness of the wall, in fact, cannot be less than about 0.6-0.65 millimetres.

A thicker tube wall would lead to problems for the user (the producer of the creamy product), especially with regard to closing up the bottom of the tube.

The main aim of the present invention is to obviate the above-described drawbacks by providing a tube obtained in a single piece by injection of plastic material, which is easy to construct and to use.

A further aim of the present invention is to provide a tube which can be made using moulds that can produce in large numbers without deteriorating.

An advantage of the present invention is to obtain higher standardisation of moulds used to realise the tubes.

A further aim of the present invention is to provide a simple solution which is easy to put into practice.

These aims and advantages are achieved by the invention, as it is characterised in the appended claims.

Disclosure of Invention

Further characteristics and advantages of the present invention will better emerge from the detailed description that follows of some embodiments of the invention, illustrated purely by way of non-limiting example in the accompanying figures of the drawings, in which:

figure 1 is a vertical elevation section of a first embodiment of the tube of the invention;

figure 2 is an enlarged-scale illustration of a detail of figure 1, relating to the bottom part of the tube;

figure 3 is an enlarged-scale illustration of a detail of figure 1, relating to the

upper part of the tube;

figure 4 is a section in vertical elevation of a further possible embodiment of the upper part of the tube.

The tube 1 of the invention is made in a single piece by injection of plastic material, generally a soft material such as, for example, polyethylene, in a specially-designed mould. In this case the term "single-piece" in relation to the tube means a tube that is made in a single operation by injection moulding, with an open bottom side for subsequent introduction of the product, and a top part, entirely conformed during the moulding process, in which the product outlet hole is made or, as will be better described herein below, a hole is afforded to which a reducer can subsequently be applied to reduce the diameter of the hole according to the degree of fluidity of the product that the tube is destined to contain.

During the same moulding process a cap can be realised, for closing the outlet hole; this cap, which is not actually a part of the tube, can also be made as a separate part. The object of the invention relates specifically to single-piece tubes made by injection moulding of a plastic material, since though this technology offers undoubted advantages over others, it also involves precise problems which make application thereof tricky; the solutions proposed by this invention are aimed at overcoming these difficulties which are inherent in the technology.

The tube of the invention comprises, as with known-type tubes, a bottom part 1a which is open and through which, in the packaging plants of the products the tube is destined for, a product will be introduced; the bottom part 1a of the tube is closable after the fluid product has been introduced, for example by heat-welding. The tube is also provided with a top part 1b in which a through-hole 2 is afforded for dispensing of the product from the tube during use of the product by the final user.

The tube of the invention can be, as for example is illustrated in the detail of figure 4, of a type comprising a threaded mouth 1c, cylindrical in shape, on which a cap is screwed. In particular, the top part 1b of the tube comprises a circular-section opening 3, which is larger than the through-hole 2 and concentric therewith. A reducer 4 is included, which is realised separately by moulding and using other known methods, which reducer 4 is conformed so as to sealingly engage in the opening 3; in this case the through-hole 2 is afforded in the reducer 4. The reducer 4 can also be welded, for example by heat-welding, to the opening 3.

The reducer 4 has a very simple conformation and can be obtained using elementary and inexpensive means; in particular, the reducer 4 comprises a disc 4b, affording the through-hole 2, which disc 4b rests superiorly on the threaded mouth when an external ring 4a of the reducer 4 is fitted in the opening 3.

This realisation enables easy manufacturing of the tube by injection, as the top part 1b thereof has an opening 3 which, independently of the desired diameter for the through-hole 2, has a diameter which permits use of very large-diameter plugs for the realisation of the opening 3 (equal to the opening 3) which therefore do not have the drawback caused by smaller-diameter plugs (equal to the through-hole 2). In this way, with a predetermined type of tube having a single internal volume, it is possible to use standard moulds realising a standard through-hole 3, but combine them with a selection of moulds for the reducers 4, which are very simple and economical to make, for realising reducers 4 having various dimensions of the through-hole 2. In this way a considerable range of tubes can be manufactured at a very limited cost. Also, a film 5 is usually attached by heat-welding onto the top part of the disc 4b in order to close off the through-hole 2; this film is detached at first use of the tube and serves as a security seal for the tube contents.

The tube can also be, as for example is illustrated in figures 1 and 3, of a type comprising a pressure-fit cap 6 which is hinged to the body of the tube and made directly by injection together with the body of the tube, using the same material as for the tube body, or different material; in general a more rigid material is used, such as, for example, polypropylene.

The cap 6 is provided with a spur 6a which sealingly inserts into the through-hole 2 of the tube. In this case an opening 3 of greater diameter is made with respect to the passage of the through-hole 2, and a reducer 4 is provided, which comprises an annular crown 4c that rests on the internal wall of the top part of the tube when an external ring 4a of the reducer 4 fits in the opening 3. An internal ring, concentric to the external ring 4a, is provided, for defining the through-hole 2 and housing the spur 6a.

The top part of the tube, from which the product contained in the tube exits during use, can be made in any other shape, even if the types indicated are those which afford easier manufacture of the tube in a single injection of plastic material.

The lower part 1a of the tube, in all realisations, is delimited by a lateral surface which exhibits a smaller thickness than that of the lateral surface delimiting the remaining part of the tube. In particular, the less-thick lateral surface has in fact a variable length starting from the bottom end of the tube, ranging from a few millimetres to 1-2 centimetres. As the lengths of these tubes are normally comprised between a few centimetres and 15-20 centimetres, the part of lateral surface which exhibits the lowest thickness is in fact about one-tenth of the total length of the tube.

To make an injection moulding in a single piece, the thicknesses of the tube wall must be at least 0.6-0.65 millimetres in order to prevent an unacceptable number of rejects during production. This thickness of the tube wall represents an

obstacle for the tube users as it is difficult, or in any case time-consuming and laborious, to close the bottom of the tube. The tube has to be supplied open at the bottom to enable the product to be introduced into it.

According to the present invention, the bottom part 1a of the tube is made with a thickness comprised between 0.40 and 0.55 millimetres. Given the modest measurements of the thinnest part, there are no excessive problems during the injection stage, which there would be if the whole of the lateral wall were of the same very limited thickness. The limited thickness of the lower zone of the tube also enables, or at least makes much easier, faster and safer, the tube closure operation.

The reduction of the thickness of the lateral surface of the lower zone of the tube is preferably obtained by keeping the external diameter of the tube constant while increasing the internal diameter thereof. Obviously in the case of a slightly conical tube the internal diameter increase in the thinner-section zone will be obtained with an internal connection zone 10 having a much greater angle of conicity than that of the tube.

Obtaining the reduction in thickness in the lower part of the tube is a very easy operation, which requires only a few modifications to moulds, which can also be moulds already in existence; a technician can see to these changes. Also, the suggested shape of this invention does not require undercuts, which can make extraction of the central part from the mould difficult.

The adoption of the simple solutions described herein enables the plastic injection technology to be used, with a consequent and considerable reduction in working costs while resulting in a better product both aesthetically and in terms of functionability. The use of this technology, already known for these tubes, had not previously been fruitfully utilised due to various drawbacks, all of which are obviated by the present invention.